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10/583,762	06/21/2006	Naohiro Sonobe	2006_0963 A	8704

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EXAMINER	
GREGORIO, GUINEVER S	
ART UNIT	PAPER NUMBER
1793	

NOTIFICATION DATE	DELIVERY MODE
04/15/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/583,762	SONOBE ET AL.	
	Examiner	Art Unit	
	GUINEVER S. GREGORIO	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 December 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 6-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 6-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1-4 and 6-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwon et al. (WIPO Pub. No. 02/083557 A1) in view of Sonobe et al. (U.S. Pat. No.

5,587,255), hereinafter '255, in view of Sonobe et al. (5,616,436), hereinafter '436. Kwon et al. teaches spherical carbon having a minor-axis-to major axis ratio of 0.99 to 1 (page 9, lines 20-23). Kwon et al. teaches the average diameter of the particles diameter is 1 to 40 microns which encompasses 1 to 20 microns (page 10, lines 7-8). Kwon et al. teaches specific surface area of 3 m^2/g or less (page 11). Using the formula provided by Applicant, Kwon et al. would provide a range of 3-120 which encompasses 3-40.

2. '255 teaches measuring the interlayer spacing of carbonaceous material to be used in the negative electrode for a non-aqueous solvent type battery because if a negative electrode for a non-aqueous solvent-type secondary battery is constituted by a carbonaceous material having d_{002} below 0.365 nm, the electrode can have only a small doping capacity for a cell active substance and is also liable to cause decomposition of the electrolyte (column 3, lines 28-40). '255 further teaches the interlayer spacing d_{002} may preferably be 0.370-0.395 nm, further preferably 0.375-0.390 nm (column 3, lines 28-40). '255 teaches carbonaceous material that has a large crystallite size in the c-axis direction causes a larger strain in the crystallites during doping-dedoping cycles which can ultimately lead to the breakage of the larger crystallites (column 1, lines 55-65). '255 teaches $L_{C(002)}$ (i.e., the size of a crystallite in the c-axis direction; sometimes also simply referred to a " L_C") (column 6, lines 13-16). '255 teaches L_C values of 1.26 and 1.15 nm which is encompassed by 1.0-3.0 nm (column 11, lines 10-22). It would have been obvious to one of ordinary skill in the art at the time of the invention to produce the round carbon spheres taught by Kwon et al. wherein the interlayer spacing

optimizes doping and the crystallite size in the c-axis is optimized so that strain during doping and dedoping cycles are minimized.

3. '436 teaches the carbonaceous material according to the present invention shows a hydrogen/carbon atomic ratio H/C of at most 0.10 based on an elementary analysis thereof (column 5, lines 19-22). '255 further teaches the atomic ratio H/C of hydrogen and carbon constituting a carbonaceous material is an index of carbonization degree of the carbonaceous material, and a lower H/C means a higher degree of carbonization (column 5, lines 23-26). '255 further teaches a carbonaceous material having an H/C ratio exceeding 0.10 is insufficiently carbonized and is not preferred and a secondary battery including a negative electrode constituted from such a carbonaceous material is liable to show a large irreversible capacity which is calculated as a difference between the doping capacity and de-doping capacity of an active substance, thus wasting the active substance (column 5, lines 27-33). It would have been obvious to one of ordinary skill in the art at the time of the invention to produce a carbonaceous material wherein the atomic ratio of H/C is less than 0.10 to optimize the doping and dedoping capacity of the material.

4. Regarding claims 2 and 12, Kwon et al. teaches thermosetting synthetic resin such as divinylbenzene styrene copolymer which corresponds with a vinyl resin (page 12, lines 1-8).

5. Regarding claim 4, Kwon et al. teaches a method for making non-graphitizable carbon made from a vinyl resin which is commensurate with the type of carbon and the material for making the non-graphitizable carbon claimed by applicant on page 7, lines

15-20 and page 16, lines 3-25 of applicant's specification (page 10, lines 9-15; page 12, lines 5-9). Kwon et al. also teaches an average diameter of the particles diameter, 1 to 40 microns, which encompasses 1 to 20 microns (page 10, lines 7-8). Therefore because Kwon et al. teaches the same type of carbon that is made from the same material and Kwon et al. teaches a diameter size that encompasses applicant's claimed diameter, Examiner takes the position that the carbon spheres taught by Kwon et al. would meet the ratio claimed by applicant.

6. Regarding claim 6, Kwon et al. teaches a method for making non-graphitizable carbon made from a vinyl resin which is commensurate with the type of carbon and the material for making the non-graphitizable carbon claimed by applicant on page 7, lines 15-20 and page 16, lines 3-25 of applicant's specification (page 10, lines 9-15; page 12, lines 5-9). Examiner takes the position that the carbon spheres would exhibit the claimed exothermic peak temperature claimed by applicant because the type of carbon and materials for making carbon spheres taught by Kwon et al. is commensurate with the type of carbon and materials claimed by applicant.

7. Regarding claim 9, Kwon et al. teaches thermosetting synthetic resin such as divinylbenzene styrene copolymer which corresponds with a vinyl resin (page 12, lines 1-8). Kwon et al. teaches a spherical carbon precursor and silicon oil as a dispersion media is oxidized at 100 to 400 ºC which corresponds with oxidizing a spherical vinyl resin obtained through suspension polymerization to oxidation at a temperature of 150 to 400 ºC in an oxidizing gas atmosphere (page 16, lines 8-15).

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art cited as applied to claim 1 above, and further in view of Nagamine et al. (U.S. Pat. No. 5,932,373). The prior art cited teaches spherical carbon material with specific properties for use in the electrode of a battery. The prior art cited does not teach bulk specific gravity. Nagamine et al. teaches graphite powder used for the production of the negative electrode of the cell preferably has a true specific gravity of 2.10 g/cm^3 or more, more preferably 2.18 g/cm^3 or more to achieve a high packing density of the electrode. Nagamine et al. teaches that in order to obtain the graphite powder having such a high true specific gravity, it is desired that the graphite satisfies the following requirements concerning an interplanar spacing of 002 plane, a thickness of crystallite along c-axis, a bulk specific gravity, an average shape parameter X_{ave}, and a G value according to Laser-Raman spectroscopy. Nagamine et al. teaches the interplanar spacing of 002 plane is in the range of 0.335 nm to 0.34 nm (inclusive of both values), preferably 0.335 nm to 0.337 nm (inclusive of both values) and the thickness of crystallite along c-axis is preferably not less than 16.0 nm, more preferably not less than 24.0 nm. Furthermore, Nagamine et al. teaches a bulk specific gravity is 0.3 g/cm^3 or more which encompasses 0.40 to 0.60. It would have been obvious to one of ordinary skill in the art at the time of the invention to manufacture a spherical carbon material with a bulk specific gravity greater than 0.3 so that a high packing density of the electrode is achieved which improves the performance of the battery electrode.

9. Claims 7, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art cited as applied to claim 1 above, and further in view of Yoon et al. (U.S. Pat. No. 6,218,050 B1). The prior art cited teaches spherical carbon material with specific properties for use in the electrode of a battery. The prior art cited does not teach coating with silica. Yoon et al. teaches coating a silica film on the carbonaceous material used for a lithium secondary battery (column 2, lines 48-55). Yoon et al. teaches coating the carbonaceous material with silica reduces the irreversible capacity of the lithium secondary batter and improves the discharge capacity (column 2, lines 50-55). It would have been obvious to one of ordinary skill in the art at the time of the invention to coat the carbon spheres taught by Kwon et al. with silica because the coating improves the function of the battery electrode.

10. Yoon et al. teaches a silica film of 2-50 nm which would obviously 0.1 to 10 wt % of a carbon particle that is 1 to 40 microns. It would have been obvious to one of ordinary skill in the art at the time of the invention to coat the carbon spheres taught by Kwon et al. with silica because the coating improves the function of the battery electrode.

11. Furthermore, although Yoon et al. does not teach a coating rate, it would have been obvious to one of ordinary skill in the art at the time of the invention to coat the carbon spheres at a rate which would produce an even coating around the spheres and also produce a coating with the desired thickness. It would have been obvious to one of ordinary skill in the art at the time of the invention to ensure the coating is uniformly distributed around the carbon spheres because an uneven coating can lead to a

disproportionate transfer of electrical energy within the electrode and disproportionate transfer between the electrode materials.

12. Claims 8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art cited as applied to claim 1 above, and further in view of Sonobe et al. (U.S. Pat. No. 5,527,643), hereinafter '643, and Lu et al. (Anodic Performance of Vapor-Derived Carbon Filaments in Lithium-Ion Secondary Battery; Carbon; 39, 493-496; 2001). The prior art cited teaches spherical carbon material with specific properties for use in the electrode of a battery. The prior art cited does not teach nitrogen content for the carbon spheres. '643 teaches a nitrogen content of 1.3% which is encompassed by applicants range of 0.5 to 5 wt% (column 11, lines 45-48). Lu et al teaches in order to improve the performance of a battery anode it is important to control the surface mircostructure by decreasing the surface oxygen content by nitridation while maintaining the order in the crystallographic structure (page 496, paragraph 6). It would have been obvious to one of ordinary skill in the art at the time of the invention to reduce the surface oxygen of the carbon spheres taught by Kwon et al. using the concentration taught by '643 because the amount taught by '643 reduces the surface oxygen without disrupting the crystallographic structure thereby improving the performance of the anode.

Response to Arguments

Applicant's arguments filed 12/11/2009 have been fully considered but they are not persuasive.

Applicant argues Kwon et al. teaches an excessively specific surface area of over 30 m2/g. Examiner disagrees. In fact, Kwon teaches a specific surface area less than 3 m2/g (page 11). Kwon et al. teaches an average particle size of 1 to 40 microns (page 28, lines 5-10; page 10, lines 7-8). Hence using the values provided by Kwon et al. in the formula provided by Applicant would provide a range of 3 to 120 which encompasses 3 to 40.

Examiner does not disagree with Applicant's characterization of Sonobe '255 and Sonobe '436. However, Examiner did not provide Sonobe '255 to teach the diameter of the carbon spheres or the specific surface area. As stated supra, Kwon et al. is provided to teach specific surface area and the diameter of the carbon spheres. Examiner provided Sonobe '255 to teach limitations which were not specified in Kwon et al. such as interlayer spacing of carbonaceous material to be used in the negative electrode for a non-aqueous solvent type battery and crystallite size in the c-axis direction and rationale for a lower H/C ratio. Therefore because Applicant has not provided a persuasive argument for why one of ordinary skill in the art would not modify Kwon et al. using the information taught by '255 Examiner is maintaining the rejection.

Examiner also did not provide '436 to teach the diameter or specific surface area for a carbon sphere. Examiner provided '436 to teach hydrogen/carbon atomic. Therefore because Applicant has not provided a persuasive argument for why one of

ordinary skill in the art would not modify Kwon et al. using the information taught by '436 Examiner is maintaining the rejection.

Applicant acknowledges Kwon et al. teaches a thermosetting resin as a preferred precursor inclusive or polyacrylonitrile resin and divinyl styrene copolymer which Applicant acknowledges is a vinyl resin. But Applicant argues these resins cannot be made spherical because of fusion or decomposition in the carbonization step. Examiner acknowledges Applicant presents an interesting argument but the purpose of Kwon et al. is to produce carbon spheres. Hence without any evidence that the invention presented by Kwon et al. would not work Examiner is going to maintain the invention and continue to rely on Kwon et al. as providing a method for making carbon spheres.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GUINEVER S. GREGORIO whose telephone number is (571)270-5827. The examiner can normally be reached on Monday-Thursday, 10:30-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curt Mayes can be reached on 571-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Gsg
April 10, 2010

/Melvin Curtis Mayes/
Supervisory Patent Examiner, Art Unit 1793